NOAA Techniques Development Laboratory Computer Program
NWS TDL CP 85-1

AFOS MONITORING OF TERMINAL FORECASTS

Silver Spring, Md.
May 1985

U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration / National Weather Service

PREFACE

The Techniques Development Laboratory's (TDL's) computer program (CP) series is a subset of TDL's technical memorandum series. The CP series documents computer programs written at TDL primarily for the Automation of Field Operations and Services (AFOS) computers.

The format for the series follows that given in the AFOS Handbook 5, Reference Handbook, Volume 6: Applications Programs, Part 1: Policy and Procedures, published by the Office of Technical Services/AFOS Operations Division.

NOAA Techniques Development Laboratory
Computer Program NWS TDL

CP 83-1 Cross Sectional Analysis of Wind Speed and Richardson Number. Gilhousen, Kemper, and Vercelli, May 1983. (PB83 205062)
CP 83-2 Simulation of Spilled Oil Behavior in Bays and Coastal Waters. Hess, October 1983. (PB84 122597)
CP 83-3 AFOS-Era Forecast Verification. Heffernan, Newton, and Miller, October 1983. (PB84 129303)
CP 83-4 AFOS Monitoring of Terminal Forecasts. Vercelli, December 1983.
CP 83-5 Generalized Exponential Markov (GEM) Updating Procedure for AFOS. Herrmann, December 1983.
CP 84-1 AFOS Display of MDR Data on Local Map Background. Newton, July 1984.
CP 84-2 AFOS Surface Observation Decoding. Perrotti, September 1984.
CP 84-3 AFOS-Era Forecast Verification. Miller, Heffernan, and Ruth, September 1984.

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TABLE OF CONTENTS

TDL CP 85-1
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1. INTRODUCTION

Aviation terminal forecasts (FT's) are issued three or four times per day, depending on location, for selected terminals within the area of responsibility of a Weather Service Forecast Office (WSFO). The FT's contain specific meteorological information on cloud heights and amounts, visibility, weather, obstructions to vision, and wind. This information is considered to be the most important to aviation interests in and near the terminal area. Once the FT's have been issued, the aviation meteorologist must maintain a constant weather-watch to ensure that the forecasts adequately represent the current or expected weather conditions. Whenever the forecast becomes unrepresentative of the current or expected weather situation, the forecaster may amend it.

A FORmula TRANslation (FORTRAN) program, described by this document,[1] will assist the forecaster with this time-consuming weather-watch function by comparing the information in the FT's with the corresponding information in the surface airways observations (SAO's). Whenever the information in the FT is no longer representative of the current situation, based on the latest SAO data, or FT or SAO decoding errors are encountered, an Automation of Field Operations and Services (AFOS) product will be created by the program. This product will contain specific information for each terminal for which a problem was detected. Creation of this product will also activate either the audio and visual alarms or just the visual alarm to direct the forecaster's attention to the problem.

The FT monitoring program, called MONITR, makes use of two sets of criteria to determine whether or not a problem exists with a particular FT. The first set contains criteria defined in the Weather Service Operations Manual Chapter D-21 (NWS, 1984; NWS, 1985) as the official amendment criteria for ceiling, visibility, wind, and weather. The second set contains criteria defined for use in the MONITR program to indicate that an amendment condition is not present yet, but that the current observed value is near an amendment value. These alert criteria are meant to provide advance warning to the forecaster that an amendment may be necessary in the near future.

In both the amendment and alert cases, the forecaster still has the final responsibility to decide whether or not the FT should be amended. One must remember that MONITR is only looking at a "snapshot" of the weather, i.e., the latest SAO. It does not look at previous observations, data from surrounding stations, or more than one forecast group in the FT. Therefore, forecaster experience and judgment are very important factors in the proper interpretation of the MONITR output. Another point to note is that MONITR will not handle all amendment situations. Four specific cases which are not handled are as follows. First, it will not check for low-level wind shear amendments since the

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[1]This document replaces Vercelli (1983).

necessary upper air information is not available to the program. Second, it does not check for amendment conditions in the outlook category. Third, because of problems with the interpretation of data from automated observation sites (off-hour observations do not contain time information), MONITR should not be used to monitor those terminals. If they are monitored, a decoding error message and alarm will be issued every time the program is run and no time information is found. Fourth, the North American Aerospace Defense Command (NORAD) criteria are not currently used in MONITR. They will, however, be added in a future revision to the program.

2. METHODOLOGY AND SOFTWARE STRUCTURE

The data flow and program relationships in the monitoring system are shown in Fig. 1. Software structures and load lines for the station directory program, MONITRSD, and the monitoring program, MONITR, are shown in Fig. 2. The operation of the third program shown in the figure, GEM, is described in detail in Herrmann (1983). The GEM program can produce an updated guidance forecast for the terminals flagged by MONITR if an optional program switch is set at run time in MONITR. This switch, described in the procedures section, instructs MONITR to create a Real-time Disk Operating System (RDOS) file, which can then be used as an input file by GEM.

The MONITRSD program is an interactive program used to create the RDOS station directory file, MONITR.D1, for the MONITR program. This file contains the call letters of the terminals to be monitored and specific time information which is required by MONITR. Generally, MONITRSD will only need to be run once at a WSFO. It is not needed again unless the disk file is damaged or the stations to be monitored are changed.

MONITR performs the actual monitoring of the FT's. Although the program can be run manually, it is recommended that the program be initiated automatically as part of an AFOS procedure. It is also recommended that the program be run several times each hour so that it can evaluate the information contained in any special SAO's which may have been stored in the AFOS database. Terminals for which no new data have been received are not reevaluated. This prevents any unnecessary decoding and checking of products.

A. Program MONITRSD

The station directory file, MONITR.D1, is created by the interactive program, MONITRSD. This directory consists of one record of three words[2] followed by one 9-word record for each station to be monitored. The file structure and contents are shown in Table 1. The first two words of record 1 contain the left-justified call letters of the WSFO running the MONITR program. The third word contains the total number of stations to be monitored. Words 1 and 2 are entered by the user. Word 3 will be filled in by the program after the user has completed data entry. For the 9-word records, only the first four words must be entered by the user for each station. Words 1 and 2, together, contain the call letters of the monitored station's parent WSFO. This is followed, in words 3 and 4, by the call letters of the station to be monitored.

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[2]A word, as defined here, is 16 bits in length which is divided into two 8-bit bytes. Each word can hold two ASCII characters or an integer value within the range -32767 to 32768, inclusive.

Table 1. Format of MONITR.D1 RDOS disk file.

Words	Contents	Variable Type
Record 1		
1-2	Call letters (left-justified) of station initiating MONITR program (e.g., WBC)	Packed ASCII
3	Total number of stations to be monitored	Integer
	The following 9 words are repeated for each station to be monitored (maximum N = 25 stations).	
Records 2-N		
1-2	Call letters (left-justified) of monitored station's parent WSFO (e.g., WBC)	Packed ASCII
3-4	Call letters (left-justified) of station to be monitored (e.g., DCA)	Packed ASCII
5	Year (e.g., 1983)	Integer
6-7	Both words combined contain total elapsed minutes since beginning of year	Integer
8	Day of month	Integer
9	SAO product time (hhmm GMT)	Integer

Each pair of words must be left-justified upon entry. Words 5 through 9, inclusive, contain time information, obtained from the SAO's used during the last execution of the MONITR program. MONITRSD will initialize these five words to zero. Once MONITR has been run, words 5 through 9, inclusive, would be updated with the latest SAO time information.

The program contains a simple editor which will allow the user to add, delete, and change entries should this become necessary after the file has been created. Use of the editor is described in the procedures section of this document.

B. Program MONITR

The monitoring program, MONITR, can be thought of as operating in several distinct steps. Each step is composed of one or more subroutines. The first step is to read the information contained in the MONITR.D1 file. This information is used to define program loop indices, identify terminals to be monitored, and determine if the current SAO information is more recent than that last used by MONITR.

The next several steps are executed for each of the terminals to be monitored. First, the latest SAO is retrieved from the AFOS database. A check is

made to make sure this information is more recent than that last used, and, if it is, the SAO is decoded (Perrotti, 1984). If it is not more recent information, the terminal is skipped for this run of the program.

Once the SAO has been decoded, the MONITR program will retrieve the latest FT for that terminal and decode the prevailing conditions (Vercelli, et al., 1985). The FT remarks will be decoded only if they are needed later in the program. MONITR will then verify that the time of the SAO falls within the boundaries of the FT starting and ending times.

The user should note that the time which appears in an SAO may not be the exact time used by MONITR. For example, say a record observation was taken at 0950 GMT. Since it was a record observation, the valid time used by MONITR will be 1000 GMT. On the other hand, if that SAO was a special observation, MONITR would use 0950 GMT as the valid time. This differentiation between SAO observation types and times is necessary to ensure that the proper FT group is used by the program.

The actual monitoring process is done for each element separately. The amendment and alert criteria used by MONITR are shown in Table 2 for ceiling, visibility, wind, and weather. For a particular element, the amendment criteria are checked first. If an amendment is indicated, the program will set an amendment flag. If no amendment is indicated, then, and only then, will the alert criteria be checked for that element. If an alert is indicated, then an alert flag will be set. These flags are used when the FT remarks are checked and for formatting the output product.

Table 2. FT amendment and alert criteria for forecast (fcst) and observed (obs) values of ceiling (cig), visibility (vis), wind speed (fspd-forecast, ospd-observed), wind direction (fdir-forecast, odir-observed), wind gust (fgst-forecast, ogst-observed), and weather (freezing rain-ZR, freezing drizzle-ZL, ice pellets-IP, and thunderstorms (TRW)).

Element	Category	Forecast	Amend	Alert
Ceiling (ft)	1	no cig, cig > 8000	obs $\leq$ 4000	4000 < obs $\leq$ 6000
	2	4000 < cig $\leq$ 8000	obs $\leq \frac{fcst}{2}$	obs $\leq$ fcst - $\frac{fcst}{4}$
	3	1000 < cig $\leq$ 4000	a) obs = no cig b) obs $\geq$ fcst x 2 c) obs $\leq \frac{fcst}{2}$	a) not applicable b) not applicable c) obs $\leq \frac{fcst}{4}$
	4	cig = 1000	a) obs = no cig b) obs $\geq$ fcst x 2 c) fcst - obs $\geq$ 300	a) not applicable b) not applicable c) fcst - obs $\geq$ 200
	5	cig < 1000	a) obs = no cig b) $\lvert$fcst-obs$\rvert$ $\geq$ 300	a) not applicable b) fcst - obs $\geq$ 200, except if fcst < 300

Table 2. Continued.

Element	Category	Forecast	Amend	Alert
Visibility (mi)	1	vis $\geq$ 5	obs $\leq$ 3	3 < obs $\leq$ 4
	2	1 < vis $\leq$ 5	a) obs $\leq \frac{fcst}{2}$	a) obs $\leq$ fcst - $\frac{fcst}{4}$
			b) obs $\geq$ fcst x 2	b) not applicable
	3	vis $\leq$ 1	$\lvert$fcst-obs$\rvert > \frac{1}{2}$	fcst - obs $> \frac{1}{4}$
Wind Speed (kt)	1	fspd and ospd < 15	No amendment message will be issued since program does not compute mean wind speed. The alert message will be based on the amendment criteria, however.	not applicable
	2	fspd or ospd $\geq$ 15	" "	$\lvert$fspd-ospd$\rvert \geq$ 10
Wind Direction (deg)	1	fdir	odir $\geq$ fdir $\pm$ 30 and ospd or fspd $\geq$ 15	odir $\geq$ fdir $\pm$ 20 and ospd > fspd $\geq$ 15
Wind gust (kt)	1	fspd or ospd $\geq$ 12	ogst $\geq$ fgst + 10 or ogst $\geq$ fspd + 10	ogst $\geq$ fgst + 8 or ogst $\geq$ fspd + 8
		fspd and ospd < 12	not applicable	not applicable
Weather	1	T, ZR, ZL, or IP	not applicable	No T, ZR, ZL, or IP within 2-h of start of FT sentence
	2	No T, ZR, ZL, or IP	T, ZR, ZL, or IP	not applicable

MONITR will only decode the FT remarks (Vercelli, et al., 1985) if at least one amendment or alert flag has been set. It will then use this information to determine if the condition necessitating the amendment or alert has been covered by the remark. The same checks made for the prevailing conditions are made for the remarks. The difference, however, is that the remarks information will only be used to downgrade or eliminate the amendment and alert flags. For instance, say an alert flag is set for ceiling based on the information

contained in the prevailing conditions. When the remarks are checked, that flag can be left as is or eliminated, but it will never be changed to an amendment. Table 3 shows the allowable changes for the flags (column 2) when they had an initial setting as shown in column 1.

Table 3. Given the initial alarm flag setting shown in column 1, based upon the comparison between the FT's prevailing conditions and the SAO, the alarm flag can be reset as indicated in column 2 when the FT remarks information is taken into consideration.

Flag based on information contained in FT's prevailing conditions	Allowable flag changes based on information contained in FT's remarks
OK	Not used
AMEND	AMEND ALERT OK
ALERT	ALERT OK

If, after the monitoring process has been completed for a terminal, an amendment, alert, or error was indicated, the program will write the information to the RDOS output file, cccTAPccc, where ccc is the WSFO's call letters (Table 1, Record 1, Words 1 and 2). If no amendments, alerts, or error messages were indicated, the program will begin to monitor the next terminal in the list. Fig. 3 is an example of the completed MONITR product where various possible messages are shown.

The last of the three main steps in the monitoring process is to store cccTAPccc (if one was created) into the AFOS database and activate the alarm (audio/visual or visual). It can be stored under either the AFOS product heading cccTAPAMD or cccTAPALT, where ccc is the WSFO's call letters. The product will be stored under cccTAPAMD if an amendment was indicated for one or more terminals monitored; otherwise, it will be stored under cccTAPALT. No product will be stored and no alarm will be activated if no amendments, alerts, or errors were indicated unless an optional switch is set by the user at run time to alert him/her of program completion. The user also has the option to instruct MONITR to write out the call letters of the problem terminals to the MONITR.D2 RDOS file by activating another run time switch. This file can then be used as input to the GEM updating program. The use of these switches is described in the next section.

3. PROCEDURES

A. Program MONITRSD

To create the MONITR.D1 station directory file, enter:

MONITRSD

at the dasher. There are no optional switches in this program. MONITRSD will prompt the user for input through a series of questions. The program contains a simple editor which will allow modification of entries (adding, deleting, changing) when they are first entered or some time in the future by responding to the appropriate questions.

The first time the program is run, the user should respond with "N" to the first question, "Do you wish to change an existing file? (Y or N)," since the MONITR.D1 file does not exist yet. Thereafter, any time the program is run, the user should use the "Y" response. (If "N" is entered when a file already exists, all the terminals will have to be reentered.)

For a new file, the program will ask the user to enter the WSFO's call letters in the form ccc (e.g., WBC). The characters must be left justified. Once the WSFO's call letters have been entered, the program will prompt for entry of the terminals to be monitored in the form ccc xxx, where the ccc is the monitored terminal's parent WSFO, and the xxx is the monitored terminal. The blank between the ccc and the xxx is required. A maximum of 25 terminals can be entered. To end data entry, the user should strike the "RETURN" key (carriage return). A listing of the file contents will be printed at the dasher in the form nn ccc xxx, where nn is the position number in the file (01 through 25), and the ccc and xxx are as defined previously.

If a listing is printed, the program will respond with three additional questions regarding adding, deleting, and changing of the file contents. Adding and deleting are self-explanatory. The change option can be used to correct misspelled entries. This option will also reinitialize words 5 through 9 (Table 1, Record 2) to zero. Note that any responses which require the user to enter the position number need to be in a two digit format; therefore, position numbers less than 10 must be entered with the leading zero.

The last question asked will be whether or not the user wants a listing of the file. Entering "N" at this point will cause the program to write the information to the MONITR.D1 file and stop. A "Y" response will start the sequence of questions over again.

B. Program MONITR

This program is initiated from the Alphanumeric Display Module (ADM) by entering:

RUN:MONITR Y/A Y/G

The two switches are optional and do not have to be typed unless the options are to be invoked.

The Y/A switch is used to alert the forecaster via the alarm light that MONITR has completed successfully and no amendment, alert, or error messages were generated. When the alarm light button is depressed, the message "JOB MONITR COMPLETED" will be displayed at the ADM. The default for successful program completion is for the program to stop with no alarms being activated unless an amendment, alert, or error message is needed.

The Y/G switch will instruct the program to create the MONITR.D2 RDOS file for use by the GEM updating program. The default is to not create the file. If the file is created, the MONITR.D2 file will contain the call letters (xxx) of the terminals for which either an amendment or an alert was indicated.

4. CAUTIONS

a. Ceiling or visibility amendment messages will be produced when the corresponding observed value is either greater than or less than the forecast value and an amendment criterion has been met; alert messages will only be produced when the observed value is less than the forecast value and an alert criterion has been met (see Table 2).

b. No amendment messages will be issued for wind speed--only alert messages will be issued. The criteria for an alert will be those defined for an amendment, except that it will use the current observed wind speed, not the mean observed wind speed. MONITR does not have the capability at this time to keep track of the wind speed so that a mean can be determined.

c. One of the more common "error" messages which will appear in the MONITR output is "xxx SAO OUTSIDE FT VALID PERIOD," where xxx is the terminal's call letters. This means that the valid time of the SAO is either earlier than the starting valid time of the FT or (less likely) after the ending time. For a regularly scheduled FT, the starting valid time used by MONITR is the second set of two digits in the six-digit date/time group (e.g., DCA FT 051010 30 SCT. 04Z VFR..). If the FT is a non-scheduled issuance (corrected, delayed, or amended), then the starting valid time is the four-digit issuance time found after the six-digit date/time group (e.g., DCA FT AMD 2 051210 1215Z C30 BKN. 04Z VFR..). Users can limit the occurrence of this message by running MONITR just prior to the issuance of new FT's, thereby updating the SAO times in the MONITR.D1 file. Should the message appear again after issuance of the FT, the forecaster is advised to manually monitor that terminal since new observational information has been received, but its valid time is still prior to the FT's starting valid time.

d. If AUTOB sites are being monitored, they will frequently trigger "time error" messages since off-hour AUTOB products do not contain a valid time. The solution to this is to not put the terminal in the MONITR.D1 file. Instead, it should be monitored manually.

e. NORAD amendment criteria are not used at this time. These terminals (currently 8 sites) should be manually monitored to see if any NORAD criteria have been met.

f. The FT decoder expects to find variables in a specific order: cloud group(s), visibility, weather/obstructions to vision, and wind (direction,

speed, gust). Typographical errors or positioning variables in the wrong order can result in misinterpretation of the information by the decoder which, in turn, can be misinterpreted by MONITR. The user should adhere to the prescribed rules for writing an FT (NWS, 1984; NWS, 1985) to avoid or limit such misinterpretations. For example, a time qualifier such as "10Z-12Z" cannot be written "10-12Z." Also, there are occasions when typographical errors (misspellings, illegal blanks, etc.) can cause an error message for an element after the element which actually contains the error. Therefore, if the problem stated in the error message is not obvious to the user, then he/she should check one of the previous elements for an error.

g. The SAO decoder operates in much the same manner as the FT decoder in that it also expects certain variables in a particular order. Here, again, data entry should be according to prescribed rules (U.S. Department of Commerce, et al., 1979).

h. One of the most frequent typographical errors which can cause decoding errors is the use of the number zero for the letter "O" and vice versa.

i. An FT remark, for the FT group being monitored, should not exceed 42 characters in length (including blanks). If it does, the FT decoder will truncate it. Only those phrases in the remark which can be decoded will be monitored. A message indicating that monitoring of the remark was incomplete will be displayed in the output product. The user should manually monitor that terminal if the message appears.

j. Should the need arise to rerun the MONITRSD program and the "change" option is used, the user should verify that words 5 through 9, inclusive, for the changed terminal were reinitialized to zero. This can be done by exiting the MONITRSD program, moving to the DPOF directory, typing:

FPRINT/Z/D MONITR.D1

at the dasher, and then checking the appropriate words for the changed terminal. If the words for that terminal were not changed to zero, the user can rerun MONITRSD and use the "delete" and "add" options to first delete the terminal from the database and then add it back again. This will force reinitialization to zero for the terminal.

5. REFERENCES

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6. PROGRAM INFORMATION AND PROCEDURES FOR INSTALLATION AND EXECUTION

A. Program Information and Installation Procedure

Program Name: MONITR

AAL ID: DBC009
Revision No.: 02.10

Function: Compares terminal forecasts (FT's) and surface airways observations (SAO's) with amendment and alert criteria and informs user when FT needs or may need amendment. Creates a local use alphanumeric product stored on DP0 and also in the AFOS database.

Program Information

Development Programmer(s):

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Gene A. Norman, Jr.

Location: Techniques Development Laboratory

Phone: FTS - 427-7639

Language: FORTRAN IV/ Rev 5.20

Maintenance Programmer(s):

David J. Vercelli

Location: Techniques Development Laboratory

Phone: FTS - 427-7639

Type: Overlay

Save file creation dates: MONITRSD.SV
Original release/ Rev 01.00 - October 6, 1983
Release/Rev 1.20 - July 12, 1984

Running time: Variable - user interactive program

Disk space: Program files - 25 RDOS blocks
Data files - 1 RDOS block

Save file creation dates: MONITR.SV
Original release/ Rev 01.00 - November 22, 1983
Release/Rev 2.10 - February 8, 1985

Running time: About 40 seconds

Disk space: Program files - 260 RDOS blocks
Data files - 2 RDOS blocks

Program Requirements

Program files:

NAME	COMMENTS
MONITRSD.SV	Program creates MONITR station directory.
MONITR.SV	
MONITR.OL	

Data files:

NAME	DP location	READ/WRITE	COMMENTS
MONITR.D1	DP0F	R/W	Created by MONITRSD, accessed and updated by MONITR.
MONITR.D2	DP0F	W	Input to GEM (AAL ID: MOH008).
cccTAPccc	DP0	W	

AFOS Products:

ID	ACTION	COMMENTS
cccTAPAMD	Stored	The ccc is the executing WSFO node.
cccTAPALT	Stored	

Load Line

```
RLDR MONITRSD BG.LB UTIL.LB FORT.LB

RLDR MONITR RDSDIR GETPRD TIMCOM PRDTIM FTSATM AFDTIM DCMPR SSEARCH COUNT
  CONVERT VSBLTY CLD FNDGRP CKEY WTHR CHEKR UPSDIR IZOUT OPNOUT HEADER BANNER
  WRITIT WXMTCH NOINT [LBS016.LB, DCDFT GETRMK DOVIS DOCIG FVIS AMDVIS ALTVIS
  FCIG FCIGCK SCIGCK AMDCIG ALTCIG DOWND SHFTWX AMALWX DECWX AMDWND AMDDIR
  ALTDIR AMDGST ALTGST, REMDEC CLDCHK RSATIM SORT GETCLD BAKUP GETHT GETYPE
  LOHT, WRTALR WRTELM WRTERR WRTFTA WRTSAO] BG.LB UTIL.LB FORT.LB
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Program Installation

1. Move MONITRSD.SV, MONITR.SV, and MONITR.OL to DP0F. Create links in DP0 to MONITRSD.SV, MONITR.SV, MONITR.OL, MONITR.D1, and MONITR.D2 on DP0F.

2. MONITRSD must be run prior to running MONITR for the first time. MONITRSD creates the MONITR.D1 data file which is used and updated by MONITR from then on.

3. Make sure the cccTAPAMD and cccTAPALT keys for the output alphanumeric products are in the PIL. The audio alarm must be set for the cccTAPAMD product and the light alarm set for the cccTAPALT product, where ccc is the executing WSFO node.

B. Program Execution and Error Conditions

Program Name: MONITR

AAL ID: DBC009
Revision No.: 02.10

Program Execution

1. Run the station directory program, MONITRSD, at the dasher. Program will prompt user for data entry.
   [NOTE: MONITRSD.SV can be deleted from DP0F and unlinked from DP0 once the MONITR.D1 file has been created. This program will only be needed again if MONITR.D1 has been destroyed or the terminals to be monitored by MONITR are changed.]

2. From an ADM, enter: RUN:MONITR Y/A Y/G

   The two switches are optional and do not have to be typed unless the options are to be invoked. The audio alarm and alarm light will be activated to signify program completion if one or more FT's need amendment. The product will be stored in the AFOS database as cccTAPAMD, where ccc is the executing WSFO node. The alarm light will be activated when one or more FT's may require amendment in the near future due to changing weather conditions, an SAO or FT decoding error prevented monitoring of an FT, or a combination of these occurs. In this case, the product will be stored as cccTAPALT, where ccc is as defined above. For both the cccTAPAMD and cccTAPALT alarms, the user need only depress the alarm light button to display the product. If no problems were detected with any of the monitored FT's, no product will be generated and no alarm will be activated unless the Y/A switch is set at run time (RUN:MONITR Y/A). This switch will activate the alarm light and produce the ADM message "JOB MONITR COMPLETED," to indicate that all stations were monitored and no problems were found. Another switch that can be set at run time is the Y/G switch. This is used to create the MONITR.D2 RDOS file which contains the call letters of the stations for which amendment or alert messages were produced. This file can be used as input to the GEM program (AAL ID: MOH008). The default is to not create the file.

   MONITR will delete the RDOS copy of the AFOS database product (cccTAPccc) upon the next running of the program. This way no more than one RDOS copy will ever be left on DP0. The RDOS copy can also be manually deleted.

Error Conditions

Error conditions other than those listed here, appearing at the dasher, denote problems that occur while accessing files, most likely caused by system/disk problems rather than program failures. Check the RDOS error code and rerun MONITR if appropriate. A complete list of error messages which may appear as part of the cccTAPAMD or cccTAPALT product is given in the Appendix.

ADM MESSAGES	MEANING
1- "JOB MONITR ABORTED--ERROR CONDITION: SEE DASHER"	This message will be displayed only if MONITR could not run at all. It is most likely the result of system/disk problems, or a missing file or link.

DASHER MESSAGES	COMMENTS
1- "GETPRD KSRCF ERR = #	A key search, done in subroutine GETPRD, for an AFOS database product (either SAO or FTA) was not successful. Generally, it indicates that a current product was not available. Check the spelling of the ccc and xxx as printed to ensure correctness. If they are not correct, rerun the MONITRSD.SV program and correct them. If they are correct, the program will monitor the station once a current FT or SAO has been stored in the data-base.
2- "GETPRD RDBKF ERR = #	This indicates that the product key was found but there was an error while trying to read the data. Product is skipped for this run of the program.
3- "RDSDIR ERR = #	Check that the MONITR.D1 file is on DP0F and that the link has been created on DP0. MONITR will not run until this has been corrected.
4- "BANNER CONVERT DATE ERR = #" or "BANNER CONVERT HR/MN ERR = #"	Problem trying to convert characters to ASCII for display. Informational only--no user action required.
5- "ERR FROM BACK-UP"	Problem trying to set pointer for cloud group. Informational only--no user action required.
6- "UNKNOWN FT TYPE @@@@@"	"@@@@@" are the five words where the FT type was expected. User should examine the FT and make any necessary corrections.

7-	"CAN'T FIND ISSUE DATE/TIME"	Messages 7 through 9 will have comparable messages as part of the output display. All are the result of FT decoder problems. User should examine the FT and make any necessary corrections.
8-	"TOO MANY TIME GROUPS IN THIS FT"	
9-	"# # CAN'T FIND VALID TIME FOR THIS FORECAST GROUP"	
10-	"ERROR IN VISIBILITY n"	Characters not recognized as possible visibility values. Visibility set to missing.

7. SUMMARY OF CHANGES TO MONITR

Program: MONITR Revision: 2.10 Created: February 8, 1985

1. FT remarks are decoded and used in the monitoring process.

2. Latest version of AIRDX (SAO decoder) is used (Perrotti, 1984).

3. Output display has been completely changed to be more user friendly.

4. Latest FT amendment criteria are used (NWS, 1984; NWS, 1985).

5. MONITR.SV and MONITR.OL files are larger due to FT remarks decoder and new SAO decoder.

6. Optional switches have been added to the RUN command.

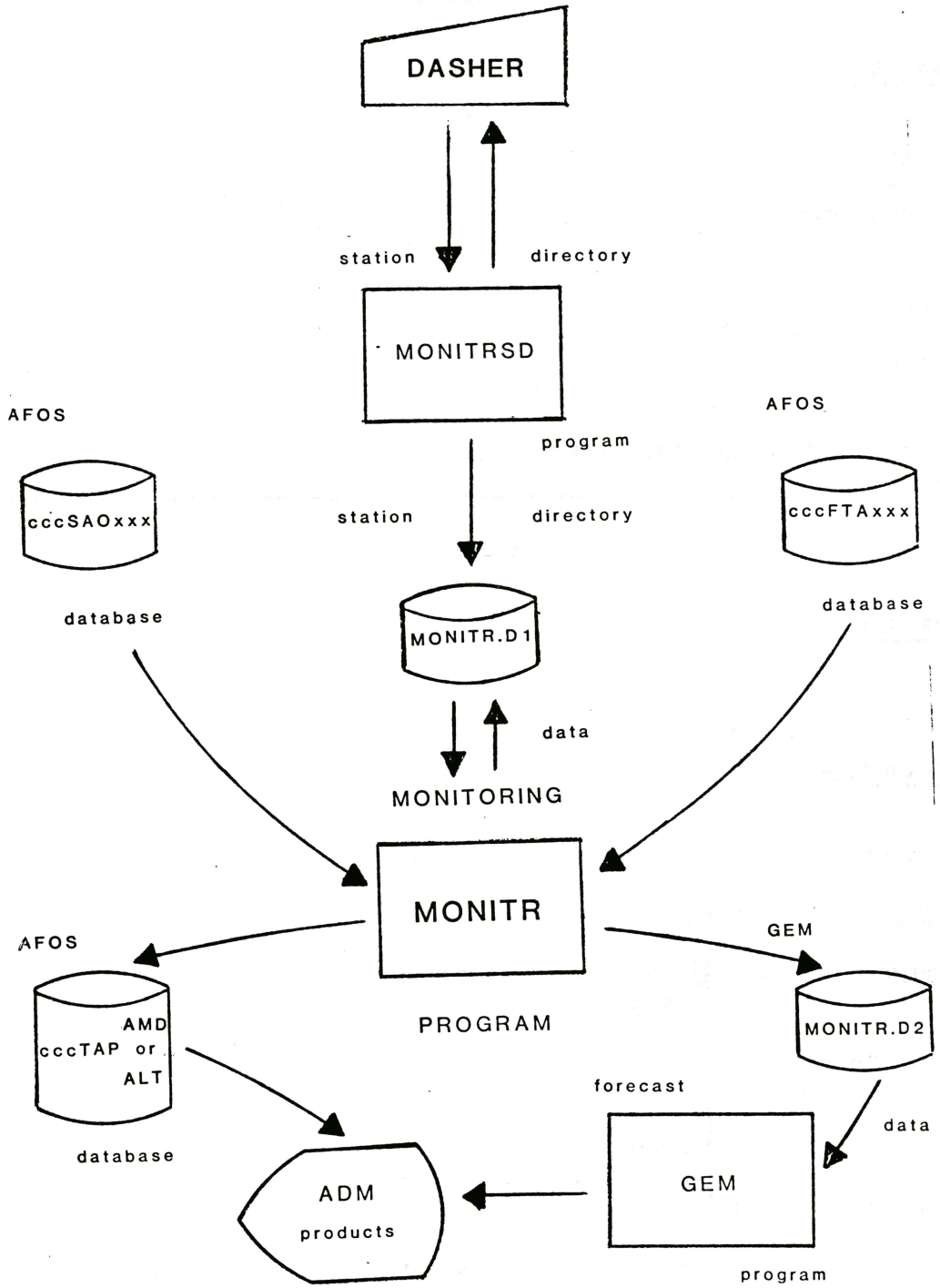


Figure 1. Data flow and program relationships for the monitoring (MONITR) and updating (GEM) system. See Herrmann (1983) for specific information on the GEM program. Program names are inside boxes. Disk and AFOS data sets are indicated by a disk platter symbol with the name of the set inside the symbol.

MONITRSD

MAIN PROGRAM

MONITRSD

SUBROUTINES

None

LOAD LINE

```
RDLR MONITRSD BG.LB UTIL.LB FORT.LB
```

MONITR

MAIN PROGRAM

MONITR

SUBROUTINES

```
RDSDIR

GETPRD ------> CKEY

TIMCOM ------> AFDTIM -------> DCMPR
               DCMPR

PRDTIM

               SSEARCH
               COUNT
               CLD ----------> :COUNT
DCDFT -------> :SSEARCH

               VSBLTY -------> SSEARCH

               WTHR ---------> CHEKR -------> SSEARCH
```

Figure 2. Software structure and load line for program MONITRSD and program MONITR. MONITRSD is used only once to create the station directory which is then used and updated by the FT monitoring program, MONITR (continued next page).

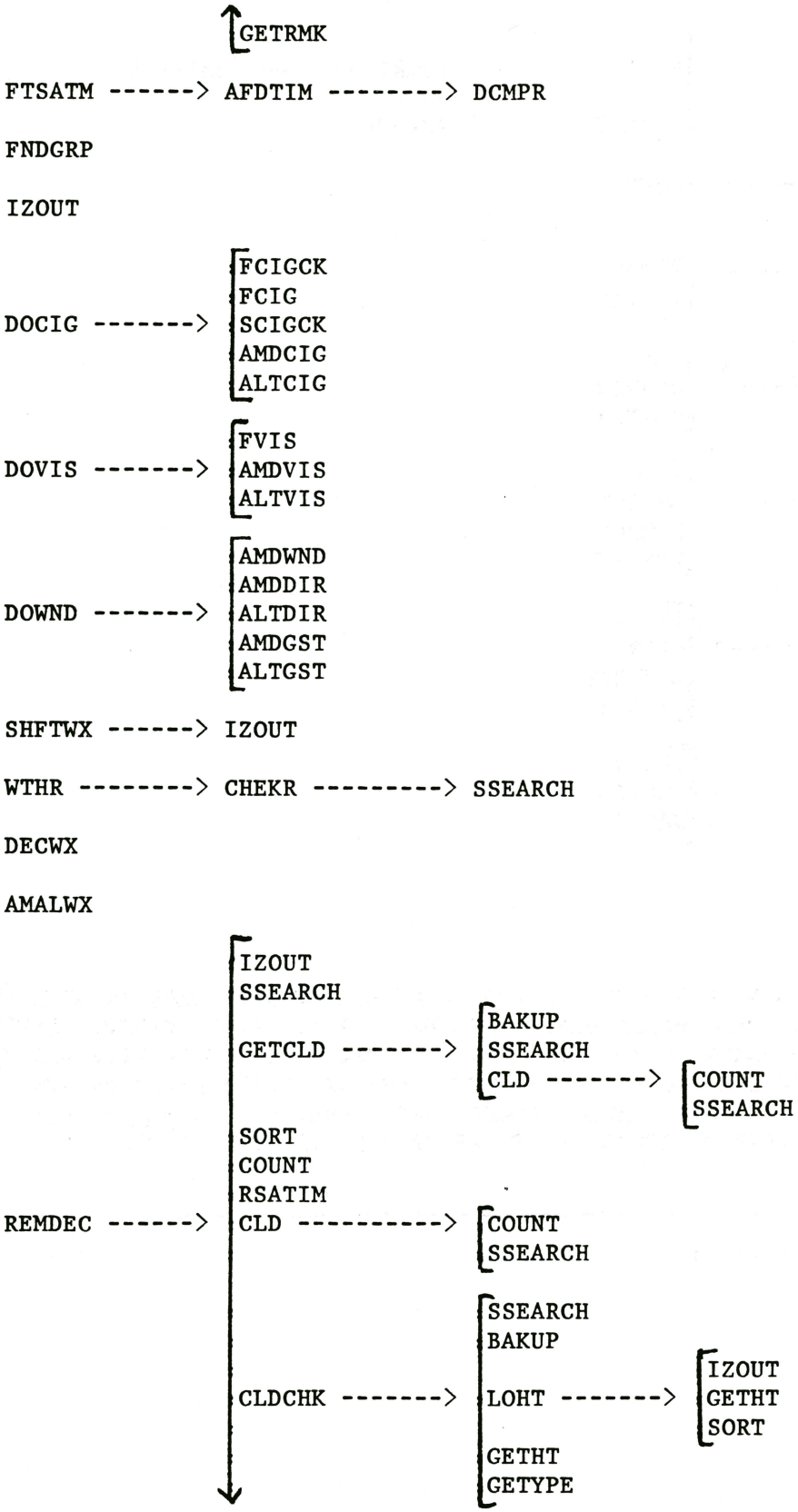
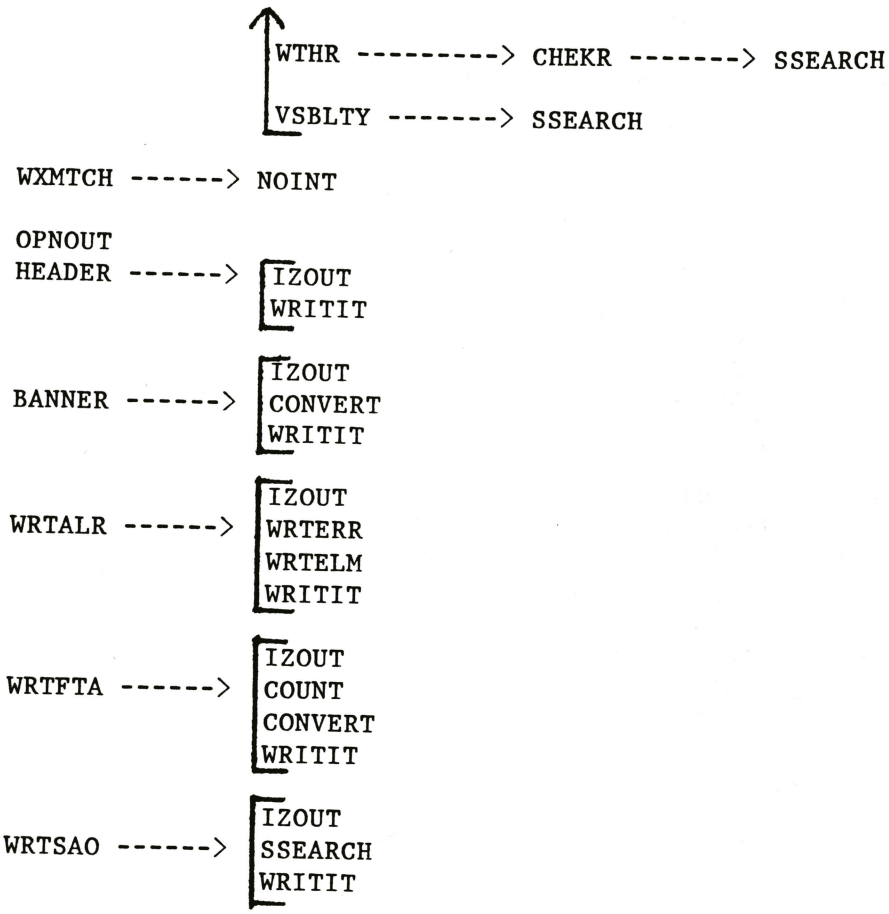


Figure 2. (continued).



Load Line

```
RLDR MONITR RDSDIR GETPRD TIMCOM PRDTIM FTSATM AFDTIM DCMPR SSEARCH COUNT
  CONVERT VSBLTY CLD FNDGRP CKEY WTHR CHEKR UPSDIR IZOUT OPNOUT HEADER BANNER
  WRITIT WXMTCH NOINT [LBS016.LB, DCDFT GETRMK DOVIS DOCIG FVIS AMDVIS ALTVIS
  FCIG FCIGCK SCIGCK AMDCIG ALTCIG DOWND SHFTWX AMALWX DECWX AMDWND AMDDIR
  ALTDIR AMDGST ALTGST, REMDEC CLDCHK RSATIM SORT GETCLD BAKUP GETHT GETYPE
  LOHT, WRTALR WRTELM WRTERR WRTFTA WRTSAO] BG.LB UTIL.LB FORT.LB
```

Figure 2. (continued).

```
WBCTAPAMD
  TAP MESSAGE  131210

iii  AMEND - VIS
             FT: 12Z C35 BKN 60 OVC 6F 2009 OCNL C30 OVC 4RW-F
             OB: SA 1152 -X M35 OVC 2L-F 024/42/41/2004/960/LB30RB08E30/
                 F4 10211 17// 20070 39 CHH RADAT 99066

jjj              SAO OUTSIDE FT VALID PERIOD

kkk  AMEND - DIR    ALERT - VIS
             FT: 12Z C11 OVC 3S- 2715G30 OCNL C3 X 3/4S-F
             OB: SA 1150 E10 OVC 2VSW- 964/25/22/2115/939/ VSBY 1V3 CIG
                 RGD/ 11406 15// 90405 25 20030// RADAT ZERO

lll  AMEND - CIG
             FT: 1000Z 30 SCT C80 BKN 2012 CHC C30 BKN
             OB: SA 1153 M33 BKN 15 011/31/23/1805/956/ 22400 1500 2008
                 4 45030

mmm  AMEND - DIR
             REMARK >42 CHAR, MONITORING OF REMARK INCOMPLETE

             FT: 0438Z C11 OVC 0715G30 LLWS OCNL 11 SCT C20 OVC CHC C6
                 OVC 11/2R-S
             OB: SA 0750 10 SCT M28 OVC 8RW-SW- 932/37/31/1408/931/RB29
                 SB45/ 98000

nnn              FT DECODER ERROR: UNKN NUMERIC FIELD

ooo  AMEND - CIG,VIS    ALERT - DIR

             FT: 00Z C8 OVC 2S-F 3214 OCNL C4 X 1/2SF
             OB: SA 0650 M11 OVC 4S-F 008/31/27/3015G19/955

ppp  AMEND - CIG,VIS,DIR,GST

             FT: 01Z C10 OVC 2415 OCNL C5 OVC 5R- CHC S-
             OB: SP 0105 WOX 1/2S-F 2917G25/965/R09RVR20

qqq          ERROR - CAN'T FIND PROPER FT SENTENCE

rrr       ALERT - CIG

             FT: 1000Z 5 SCT C40 OVC 5R-F CHC C5 BKN 2R-F
             OB: RS 0949 5 SCT M28 BKN 40 OVC 6R-F 255/46/43/0405/029/
                 RB08
```

Figure 3. An example of the MONITR output product. In an actual product, the lower case letters (iii through rrr) would be replaced with the call letters of the stations. The amendment and alert messages are based on the criteria shown in Table 2.

APPENDIX

The error messages listed here will only occur in a cccTAPAMD or cccTAPALT product. Several examples are shown in Fig. 3.

cccTAPAMD or cccTAPALT error messages		Comments
1- FILE READ ERROR	(2)	Error messages 1 through 13 will be preceeded with the message "SAO DECODER ERROR." These messages correspond to the return codes defined in Perrotti (1984) which are shown here in parentheses following each message.
2- NO APPROPRIATE TIME VERSION	(3)	
3- UNKN OB TYPE	(4)	
4- UNKN OB TIME	(5)	
5- NO CALL SIGN FOUND	(-4)	
6- OBSCURE END OF OB	(-3)	
7- WMO HEADER ERR	(-2)	
8- BAD VERSION	(-1)	
9- TOO MANY MISSING VALUES	(0)	
10- COAST GUARD OB	(71)	
11- BUOY OR CMAN OB	(86)	
12- SHIP OB	(91 or 96)	
13- UNKN ERR TYPE	(none of the above)	
14- ISSUE DATE/TIME ERR		Error messages 14 through 20 will be preceeded with the message "FT DECODER ERROR." No. 14 indicates a problem finding the 6 digit date/time group. The decoder will only allow for 10 groups in an FT (No. 15). It expects each group to begin with a 2 or 4 digit time followed by "Z," (except the first group). Frequently, a missing "Z" or misplaced "Z" will be the cause of No. 16. Since program expects certain elements in a certain order with a certain number or type of characters, No. 17 is usually the result of a typographical error (e.g., 102 for a visibility rather than 1/2). Nos. 18 and 19 are similar to No. 17. The decoder will only allow for FT's which are less than or equal to 2 AFOS blocks in size (No. 20).
15- EXCEEDED 10 TIME GROUPS		
16- CAN'T FIND A SENTENCE TIME. MISSING 'Z'?		
17- UNKN NUMERIC FIELD		
18- INVALID WIND FIELD		
19- INVALID GUST FIELD		
20- FT EXCEEDED 2 BLOCKS		
21- REMARK ERROR, MONITORING OF REMARK INCOMPLETE		Error message 21 through 25 are the result of FT remark decoding problems. For more information on possible causes see Vercelli, et al. (1985). Briefly, Nos. 21,
22- REMARK > 42 CHAR AND ERROR DETECTED, MONITORING OF REMARK INCOMPLETE		

23- TOO MANY REMARK ERRORS, MONITORED PREVAILING ONLY TOO MANY REMARK ERRORS AND REMARK > 42 CHAR, MONITORED PREVAILING ONLY 25- REMARK > 42 CHAR, MONITORING OF REMARK INCOMPLETE	22, and 25 indicate some use was made of remark information but some decoding errors prevented the use of all the information. Nos. 23 and 24 indicate that none of the remarks information was used. In all these cases, the user should manually monitor the terminal to see if an amendment is required. Also, the error should be corrected in the FT if possible. Otherwise, the error message will be produced each time the program is run until a new FT group becomes valid.
26- ERROR - UNABLE TO LOCATE SAO 27- ERROR - UNABLE TO LOCATE FT	Errors 26 and 27 indicate a missing product or possibly a misspelling of the call letters in the MONITR.D1 file. If the call letters are misspelled, they can be corrected by rerunning the MONITRSD program.
28- ERROR - SA TIME CK, RERUN MONITRSD.SV, REINIT PROBLEM TERM	The SAO time computed from the product header indicates it is older than that last used. System date/time may be wrong or the SAO time may have been mistyped. MONITRSD will allow reinitialization of the time contained in the MONITR.D1 file by using either the change option or the delete and add options.
29- ERROR - CAN'T FIND PROPER FT SENTENCE	Program attempts to find the FT group valid for the current SAO time. A mistyped time in either the FT or SAO could result in this error.
30- INDETERMINATE ERROR - THIS TERMINAL SKIPPED	Program could not decode a product for an unknown reason. User should examine the product (FT or SAO) and attempt to correct it.
31- SAO OUTSIDE FT VALID PERIOD	The valid time for the SAO does not fall within the valid range of the FT. Usually occurs when new FT's or amended FT's are issued. See Section 4 - Cautions, Item C for a more complete explanation.